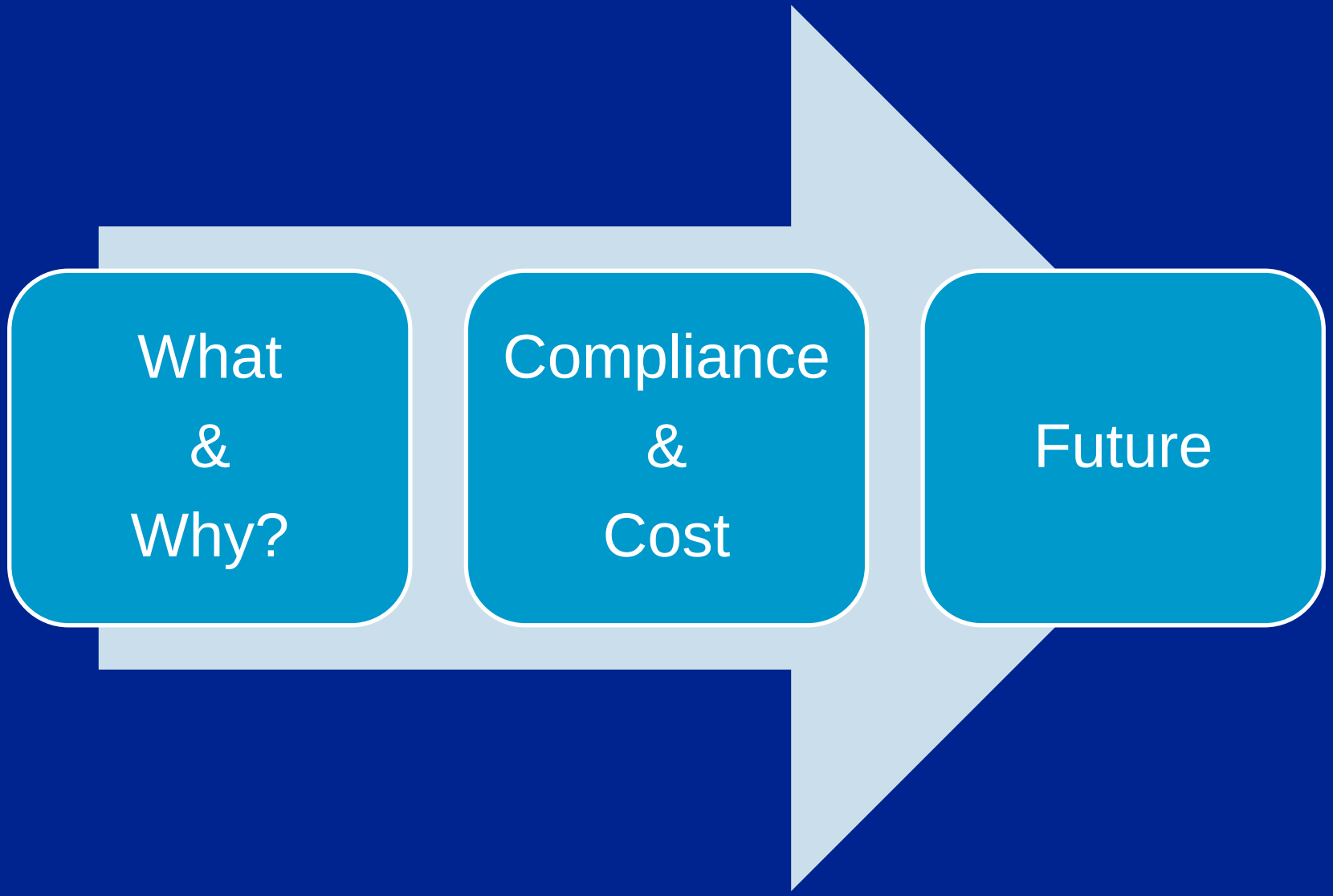
Helping Massachusetts Municipalities Create a Greener Energy Future

Stretch Code Informational Session

September 12, 2013

Agenda



What is the Stretch Code?

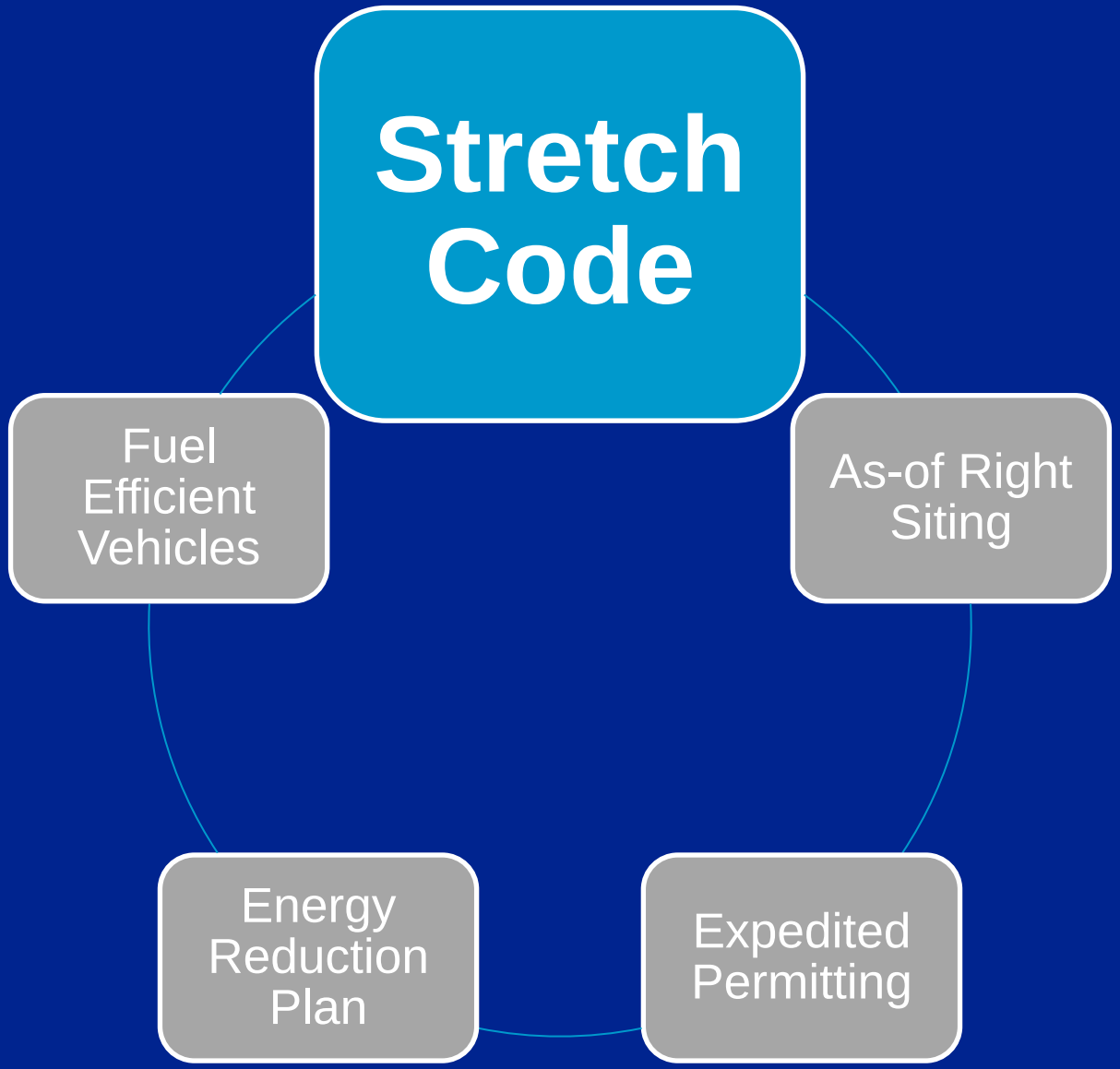
- Affects the energy code only
- Amendment to the MA base energy code
  - Residential Construction:
    - 15-20% more energy efficient
  - Commercial:
    - 20% more energy efficient

- The Stretch Code is similar to the 2012 IECC

Misconceptions

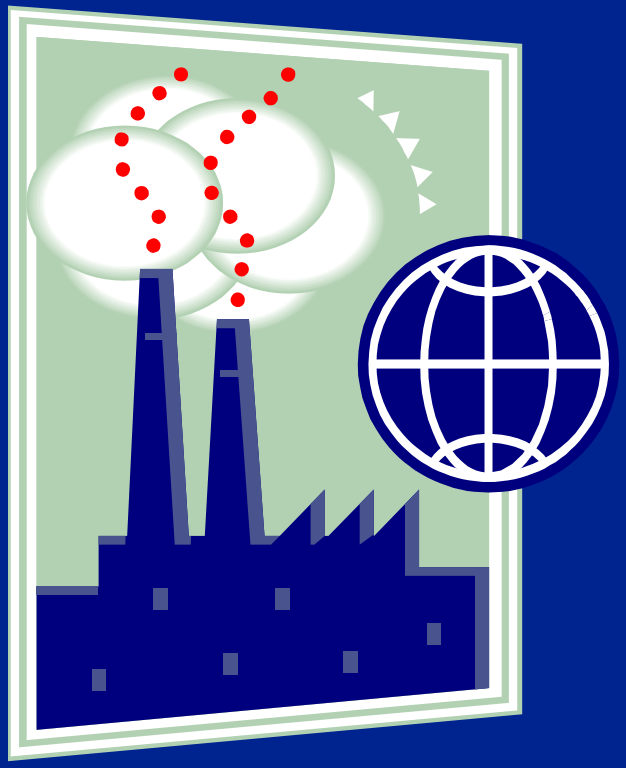
- The Stretch Code is new and experimental
- The Stretch Code requires tight unhealthy homes
- The Stretch Code requires foam insulation
- The Stretch Code requires mechanical ventilation
- Homes with oil heat cannot meet the Stretch Code
- Town residents will be required to update their existing homes

What is the Stretch Code?



Why Adopt the Stretch Code?

- Less Infrastructure
- Imported fuels
- Natural Resources
- Pollution
- Climate Change
- Grants for Municipal Projects

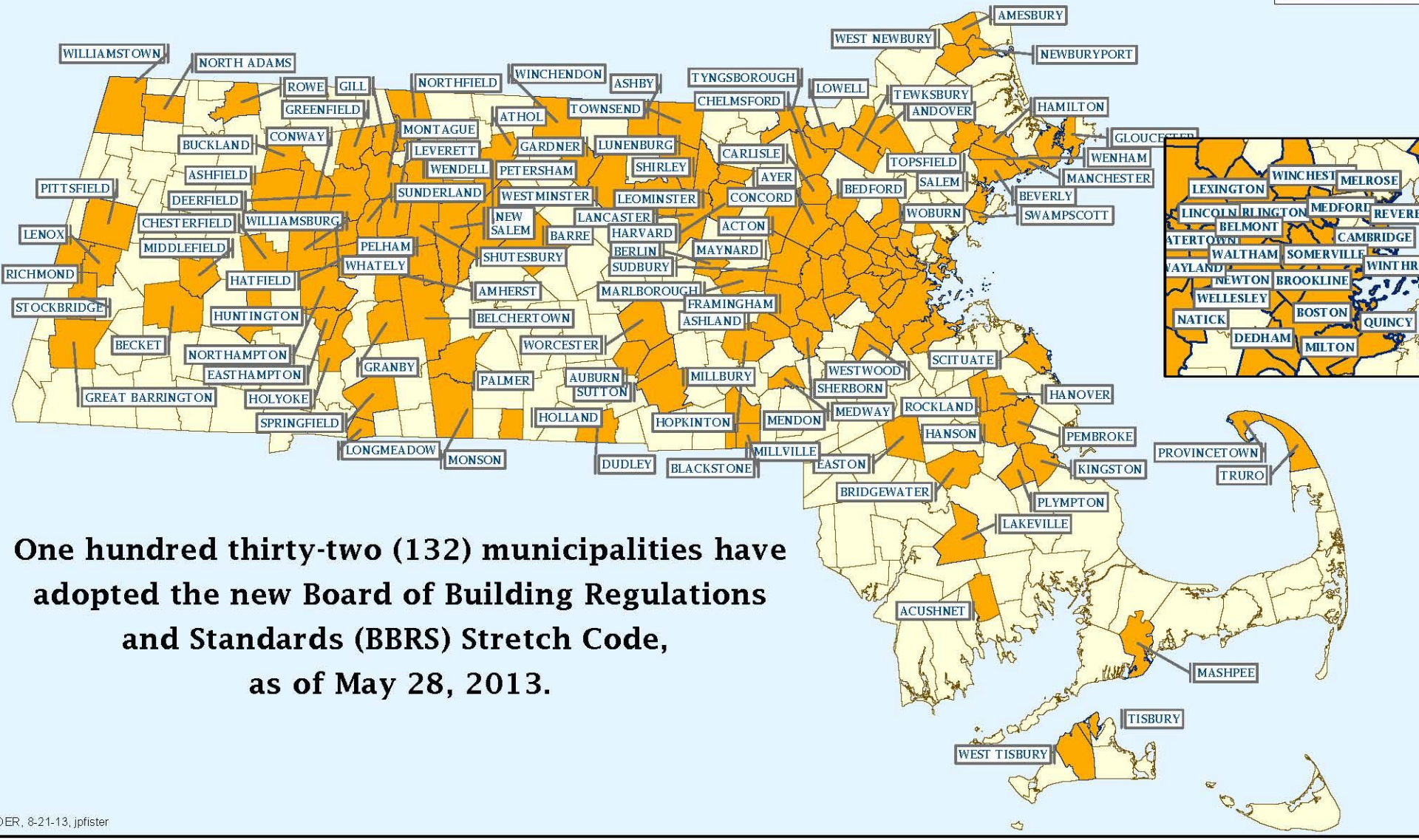


Why an Optional Stretch Code?

- Several towns and cities asked for the ability to adopt stronger building codes

- BBRS developed one alternative code that is consistent across the state

Stretch Code Adoption, by Community



One hundred thirty-two (132) municipalities have adopted the new Board of Building Regulations and Standards (BBRS) Stretch Code, as of May 28, 2013.

What does the Stretch Code Apply to?

- Same application as the MA base energy code
  - Insulation
  - Doors, Windows, Skylights
  - Mechanical Equipment
  - Lighting
  - Appliances
  - Building tightness
  - Duct tightness
  - Renewables

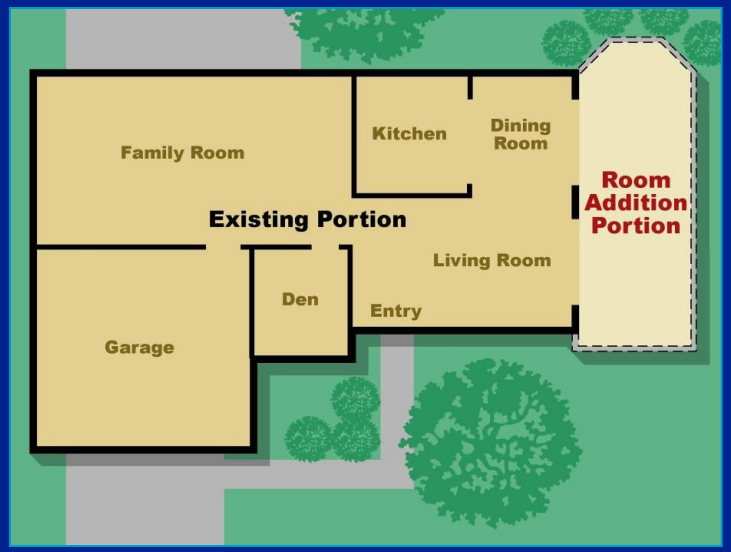
What does the Stretch Code Apply to?

- Residential
  - Additions
  - Home Renovations
  - New Construction
- Commercial (5,000+sq/ft)
  - New Construction
  - Additions
  - Renovations Exempt

Additions and Renovations

Prescriptive or Performance Path

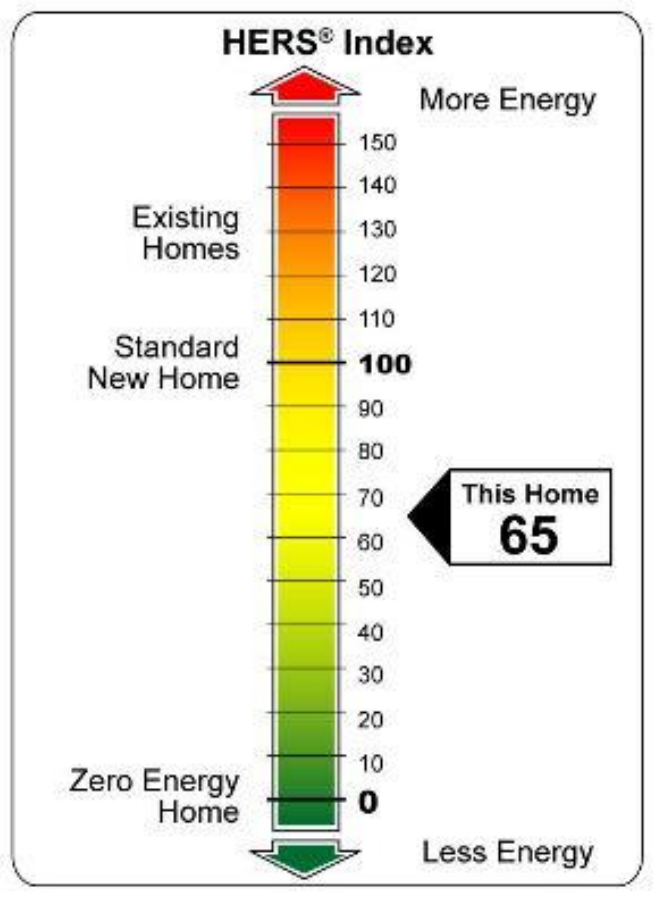
- Prescriptive Path
  - ENERGY STAR Windows, Doors and Skylights
  - Tight Ducts – completely new duct systems only
  - Contractor Verified Thermal Bypass Checklist
- Performance Path
  - Whole house HERS Rating
    - Renovations:
      - HERS 85 < 2,000 sq ft.
      - HERS 80 ≥ 2,000 sq ft.
    - Additions:
      - HERS 70 < 3,000 sq ft.
      - HERS 65 ≥ 3,000 sq ft.



New Homes

Performance Path

- Performance is the only option
  - HERS 70 < 3,000 sq ft.
  - HERS 65 ≥ 3,000 sq ft.
- HERS Rating Company
  - Review building plans
  - Thermal bypass Checklist
  - Blower-door and duct testing



New Homes
Performance Path

- Home Energy Rating System (HERS) Index
  - Internal Revenue Service
  - U.S. Department of Energy
  - U.S. Environmental Protection Agency
  - Mortgage Industry
  - Massachusetts Base Code - Alternative Path
  - Mass Save Residential New Construction Program

New Homes

Performance Path

- Governed by the Residential Energy Services Network (RESNET)
  - Technical Standards
  - Testing Procedures
  - Quality Assurance
  - Continuing Education
  - Code of Ethics
  - Complaint Resolution

RESNET®

Residential Incentives

- Almost the same as the Stretch Code
  - Approx 30% of new homes in MA
- Builder incentives/rebates
  - $750 - $7000 for SFD
  - $350 - $4,000 for MF
- Additional
  - Appliances – up to $50
  - Heating – up to $1,500
  - Cooling – up to $500
  - Lighting – free CFLs
- HERS raters
  - $700 - $900

mass save®
Savings through energy efficiency

Massachusetts Residential New Construction Program

Cost of the Stretch Code

Housetype	Size	Upgrade Costs	Add'l Annual Mortgage	Annual Savings
Single Family	2,672	$2,949	$214	$507
w/ incentives	2,672	$1,755	$127	$516
Single Family	4,462	$6,476	$471	$1,455
w/ incentives	4.462	$5,176	$376	$1,455
Single Family	1,708	$4,162	$302	$583
w/ incentives	1,708	$3,243	$236	$595

COMMERCIAL STRETCH CODE

Commercial 'Stretch' Appendix

- New buildings and additions over 5,000 ft^2
- Two Options (depending on size)
  - Performance option - 20% below Code
  - Prescriptive option for most building types

    5,000 - 100,000 ft2

Commercial 'Stretch' Appendix

- Performance option
  - 20% below Code (ASHRAE 90.1-2007 appendix G)
  - all buildings over 100,000 ft^2
  - Special Energy Use Buildings over 40,000 ft^2 (Labs, Supermarkets, Warehouses)
- Prescriptive option for most building types
  - 5,000 - 100,000 ft2
- Special Code Exemptions (comply with base code)

Fidelity Bank

Corporate Office and Branch Case Study

Leominster, MA

Advanced Building Features

- High Efficiency T-5 Pendant Lighting
- Lighting Control Efficiency
- Reduced Lighting Power Density
- Efficient Site Lighting
- Additional Wall Insulation
- High Performance Glazing
- Efficient VAV RTU's, with ECM Motors
- Demand Control Ventilation
- Part Load HVAC Efficiency Enhancements

Funded Utility Services Support

- Early Life Cycle Cost Analysis
- Integrated Design Team Approach
- Commissioning

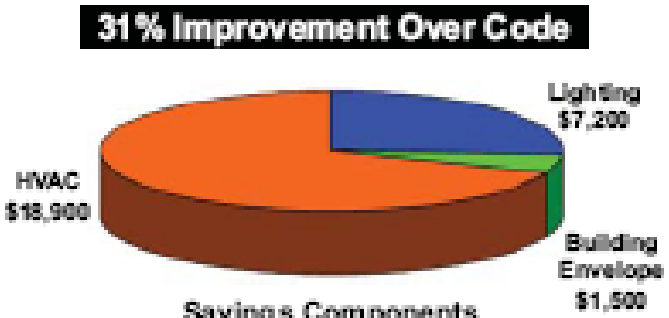
High Performance Building Design Uses 31% Less Energy

Savings Projection

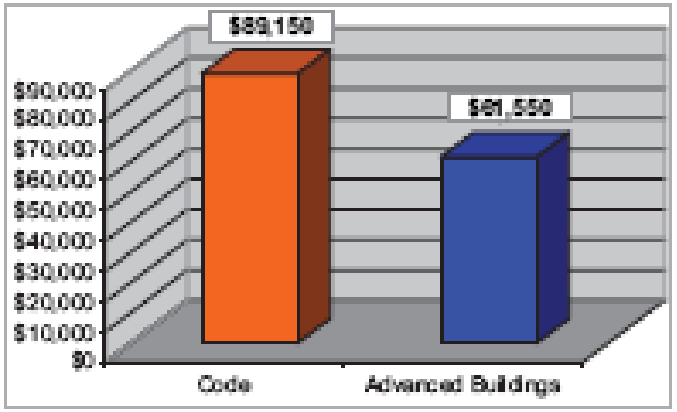
Annual Energy Savings:	$ 27,600
Additional Cost for Upgrades:	$100,622
Utility Incentives:	- $ 66,587
Net Owner Costs:	$ 34,035

Payback with Incentives: 1.2 years ROI: 83%

Payback without Incentives: 3.7 years ROI: 27%



Savings Components
($27,600 annual savings)



Annual Energy Costs

Lighting Savings Summary

The lighting layout consisted mainly of T-5 pendants in open office areas, and the latest generation of recessed T-5 fixtures in the remaining areas.

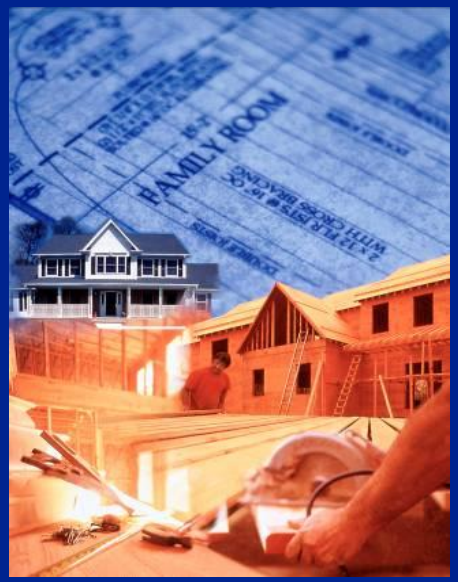
Projected Lighting Savings: $7,200

	Mass Energy Code	Advanced Buildings Criteria	Final Design	% Reduction
Lighting Power Density	1.34 w/SF	0.96 w/SF	0.86 w/SF	36%

Improved lighting quality while using less energy!

Code Compliance & Inspections

- Same as base code
- Code Official has the same authority
  - Same building inspections
  - Approves building documents



Training on new energy codes

- Covering both the IECC 2009 & Stretch code
- Provided free to all Code Officials
- Provided at cost to building professionals
- Register online: www.cetonline.org
- Energy star homes training available for free: www.MassSave.com
- Utilities offer commercial ‘Core Performance’ energy training

Future of the Stretch Code

- The MA base energy code will update in 2014
- The Stretch Code will update too
  - More energy efficient
  - No details yet
  - Automatic Adoption

Questions?

Massachusetts Stretch Code Improvement - Cash Flow

Baseline Home (2,672 sf)

	IECC 2009 Code	Stretch Code	Stretch Code - with ENERGY STAR[4,5] -
HERS Index Modeled in REM/Rate	86	70	70
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Floor, R30 - Walls, R21 - Ceiling, R38 G2 - Heating, 80 AFUE - Cooling, 13 SEER - Water Heating, .59 EF - Duct leakage, 8% - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Ceiling, R38 G1 - Heating, 94 AFUE - Water heating, .62 EF - Infiltration, 4 ACH50 - Efficient lighting, 75% - Exhaust Only Ventilation	- Ceiling, R38 G1 - Heating, 94 AFUE - Water heating, .62 EF - Duct leakage, 6% - Infiltration, 5 ACH50 - Efficient lighting, 80% - Exhaust Only Ventilation
Improvement Costs		$ 2,049	$ 2,155
HERS Rater Fee[1]		$ 900	$ 900
HERS Rater reimbursement[2]		-	$ (650)
ENERGY STAR Incentive[3]		-	$ (650)
Total Improvement Costs		$ 2,949	$ 1,755
Mortgage Interest Rate		6%	6%
Loan Term (Years)		30	30
Annual Incremental Mortgage Payment		$ 214	$ 127
Annual Energy Costs[6]	$ 3,970	$ 3,463	$ 3,454
Annual Energy Savings from Baseline		$ 507	$ 516
Annual Cash Flow	**$ -**	**$ 293**	**$ 389**

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] HERS Rater Fees are reimbursed by the Massachusetts ENERGY STAR Homes program by between $650-900 per unit, depending upon the HERS rating achieved.

[3] Massachusetts ENERGY STAR Homes Program may receive a minimum incentive of $650.

[4] ENERGY STAR requirements have been added to the Stretch Code package.

[5] Stretch code homes may qualify for of $1250 where the HERS rating is ~65 or lower

[6] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.

Massachusetts Stretch Code Improvement - Cash Flow

Large Home (4,462 sf)

	IECC 2009 Code	Stretch Code	Stretch Code - with ENERGY STAR[4,5] -
HERS Index Modeled in REM/Rate	92	65	65
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Floor, R30 - Walls, R21 - Ceiling, R38 G2 - Heating, 80 AFUE - Cooling, 13 SEER - Water Heating, .59 EF - Duct leakage, 8% - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Duct Leakage, 6% - Infiltration, 3 ACH50 - Efficient Lighting, 90% - Exhaust Only Ventilation	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Duct Leakage, 6% - Infiltration, 3 ACH50 - Efficient Lighting, 90% - Exhaust Only Ventilation
Improvement Costs		$ 5,576	$ 5,576
HERS Rater Fee[1]		$ 900	$ 900
HERS Rater reimbursement[2]		-	$ (650)
ENERGY STAR Incentive[3]		-	$ (650)
Total Improvement Costs		$ 6,476	$ 5,176
Mortgage Interest Rate		6%	6%
Loan Term (Years)		30	30
Annual Incremental Mortgage Payment		$ 471	$ 376
Annual Energy Costs[6]	$ 6,510	$ 5,055	$ 5,055
Annual Energy Savings from Baseline		$ 1,455	$ 1,455
Annual Cash Flow	**$ -**	**$ 984**	**$ 1,079**

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] HERS Rater Fees are reimbursed by the Massachusetts ENERGY STAR Homes program by between $650-900 per unit, depending upon the HERS rating achieved.

[3] Massachusetts ENERGY STAR Homes Program may receive a minimum incentive of $650.

[4] ENERGY STAR requirements have been added to the Stretch Code package.

[5] Stretch code homes may qualify for of $1250 where the HERS rating is ~65 or lower

[6] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.

Massachusetts Stretch Code Improvement - Cash Flow

Small Home (1,708 sf)

	IECC 2009 Code	Stretch Code	Stretch Code - with ENERGY STAR[4,5] -
HERS Index Modeled in REM/Rate	86	70	70
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Floor, R30 - Walls, R21 - Ceiling, R38 G2 - Heating, 80 AFUE - Cooling, 13 SEER - Water Heating, .59 EF - Duct leakage, 8% - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Infiltration, 5 ACH50 - Efficient lighting, 75% - Exhaust Only Ventilation	- Ceiling, R60 G1 - Heating, 94 AFUE - Water Heating, .62 EF - Infiltration, 5 ACH50 - Duct leakage, 6% - Efficient lighting, 80% - Exhaust Only Ventilation
Improvement Costs		$ 3,262	$ 3,643
HERS Rater Fee[1]		$ 900	$ 900
HERS Rater reimbursement[2]		-	$ (650)
ENERGY STAR Incentive[3]		-	$ (650)
Total Improvement Costs		$ 4,162	$ 3,243
Mortgage Interest Rate		6%	6%
Loan Term (Years)		30	30
Annual Incremental Mortgage Payment		$ 302	$ 236
Annual Energy Costs[6]	$ 3,754	$ 3,171	$ 3,159
Annual Energy Savings from Baseline		$ 583	$ 595
Annual Cash Flow	**$ -**	**$ 281**	**$ 359**

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] HERS Rater Fees are reimbursed by the Massachusetts ENERGY STAR Homes program by between $650-900 per unit, depending upon the HERS rating achieved.

[3] Massachusetts ENERGY STAR Homes Program may receive a minimum incentive of $650.

[4] ENERGY STAR requirements have been added to the Stretch Code package.

[5] Stretch code homes may qualify for of $1250 where the HERS rating is ~65 or lower

[6] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.

Massachusetts Stretch Code Improvement - Cash Flow

Cambridge Triple Decker (5,136 sf)

	IECC 2009 Code	Stretch Code
HERS Index Modeled in REM/Rate	**92**	**85**
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Foundation Walls, R0 - Frame Floor, R30 - Walls, R13 - Ceiling, R38 G2 - Heating, 80 AFUE - Water Heating, .59 EF - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Infiltration, 4.5 ACH50 - Efficient Lighting, 75% - Exhaust Only Ventilation
Improvement Costs		$ 2,202
HERS Rater Fee1		$ 900
Total Improvement Costs		$ 3,102
Mortgage Interest Rate		6%
Loan Term (Years)		30
Annual Incremental Mortgage Payment		$ 225
Annual Energy Costs2	$ 6,828	$ 6,263
Annual Energy Savings from Baseline		$ 565
Annual Cash Flow	**$ -**	**$ 340**

Notes

[1] Estimated Massachusetts ENERGY STAR Homes Program HERS Rater Fee (Range is from $750-$1500, but typically close to $750). Includes cost for conducting Thermal Bypass Inspection

[2] Annual energy costs are based on most recently available fuel costs, from November 2009. Costs for heating are based on natural gas prices, the least expensive heating fuel. With oil, savings would increase.